Client's ref.: ESCM #21/
File: 0503-9729-US/Final/Teresa/Kevin/TKHR

TITLE

METHOD AND SYSTEM OF CLASSIFYING DEMAND DATA

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to an allocation planning technology, and in particular to a computer-implemented method of classifying demand data for one allocation term (e.g., one month).

Description of the Related Art

In factory management, a demand plan is usually requested over a long time, such as one year or 18 months. A demand plan may be divided into many terms, each term having its own demand data. As an example, an 18-month demand plan of one month terms contains demand data for each term. Generally speaking, the supply manufacturer produces a supply plan corresponding to the demand plan for supply capacity management. The supply plan includes supply data corresponding to the demand data of the demand plan.

Because many variables may appear in the duration of the supply plan, the supply plan should be examined each term, such as once a month, to ensure that it can be maintained. If any exceptions occur, such as unexpected machine shutdown or a wrong recipe applied in a working tool, the supply manufacturer must respond to maintain the supply plan. Especially in the currently-competitive market, the maintenance of a supply plan directly impacts quality of service, and, thereby customer satisfaction.

The goals of maintaining a supply plan is to satisfy orders totally, to satisfy demand data if possible, and distinguish the exceeding part of supply data from demand data. That is to say, demand data should be prioritized for better utilization of further capacity management.

Presently, commercial supply plans do not reflect or embody these priorities. Instead, supply plans generally consider only current demand and order data, while ignoring the relative information. Consequently, commercial supply plan applications generally are not suitable for long-term factory management, especially for a manufacturer with a supply plan of multiple considerable phases, such as IC manufacturers or airline companies.

United States Patent 6,393,332 discloses a method and system for providing sufficient availability of manufacturing resources to meet unanticipated demand. The method considers the relationship between an order and a manufacturing plan and attempts to fulfill the order by changing the manufacturing plan. However, the method disclosed focuses on the demand plan daily arrangement, not suitable for manufacturers with long-term, complex supply plans, such as IC manufacturers.

SUMMARY

Accordingly, an object of the invention is to provide a method of classifying demand data into different prioritized classes. The prioritized demand data can be applied to further utilization, such as capacity management. The inventive method is applied each term to examine demand data, order data, and supply data, thus maintaining a supply plan.

To achieve the foregoing and other objects, the invention is directed to novel systems and methods for overcoming conventional supply plan deviation problems. The method inputs demand data, order data, and supply data. The demand data and order data refer to one allocation term (e.g., one month). The supply data includes month information. The method then classifies the demand data into prioritized demand data. The number of the prioritized classes is dependent upon the actual request. In addition, the method combines and outputs the prioritized demand data and updates the supply data for further utilization.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention can be more fully understood by reading the following detailed description and examples with references made to the accompanying drawings, wherein:

Fig. 1 is a flowchart of the computer-implemented method of classifying demand data for one allocation term.

Fig. 2 is a flowchart of detailed steps of the classification step of one embodiment.

Fig. 3a is a flowchart of detailed steps of the assignment step of the method.

Fig. 3b is a flowchart of detailed steps of the assignment step of one embodiment.

Fig. 4 is a diagram of the system for classifying demand data for one allocation term.

Fig. 5 is a diagram of the storage medium for storing a computer program providing a method of classifying demand data for one allocation term.

DETAILED DESCRIPTION OF EMBODIMENTS OF THE INVENTION

As summarized above, the present invention is directed to novel systems and methods for overcoming conventional supply plan deviation problems. In one embodiment, the inventive method first inputs the demand data for one allocation term (e.g., one month), order data of the allocation term, and supply data. The demand data includes demand amounts, corresponding demand factories, and corresponding demand manufacturing technologies. The order data includes order amounts, corresponding order factories, and corresponding order manufacturing technologies. The supply data includes supply amounts, corresponding supply factories, corresponding supply manufacturing technologies, and corresponding supply terms.

As noted above, the allocation term may be one month. However, consistent with the invention, the allocation term may be a period of time more or less than one month as well. Further still, the embodiments described herein have generally been described with reference to a single allocation term. However, as will be appreciated by persons skilled in the art, the concepts of the invention are readily applicable to a plurality of allocation terms as well.

For example, in an IC manufacturer, if the allocation term is one month, such as 2004 April, the demand data can be a list of customers' demands of the month, including product names, amounts, foundries, and manufacturing technologies. Here, because different foundries may support the same manufacturing technology, e.g. sputtering, the customers can designate preference foundries in the list. Similarly, one manufacturing process may be

accomplished by different manufacturing technology, e.g. different technology of sputtering, the preference manufacturing technology can be designated in the list too. The order data and the supply data are similar to the demand data. The supply data is from the view of the manufacturer, considering the preference foundries and manufacturing technology of manufacturer.

In accordance with one embodiment, a portion of the demand data, belonging to the order data, is designated as first priority demand data. The first priority demand data assignment is accomplished by several comparisons between order data and the demand data according to the different conditions of the amount, the factory, and the manufacturing technology. First, the same order amount and demand amount, the same order factory and demand factory, and the same order manufacturing technology and demand manufacturing technology are considered. Next, the order data and the demand data are compared according to the same order amount and demand amount, the different order factory and demand factory, and the same order manufacturing technology and demand manufacturing technology. Finally, the order data and the demand data are compared according to the same order amount and demand amount, the same order factory and demand factory, and the different order manufacturing technology and demand manufacturing technology.

Carrying on, a portion of the demand data, not belonging to the order data may be designated as unfinished demand data. A portion of the supply data, not belonging to the order data, may be designated as unfinished supply data.

A portion of the unfinished demand data, belonging to the unfinished supply data, is then designated as second priority demand data. Similarly, the second priority demand data assignment is also accomplished by several comparisons. The assignment compares the unfinished demand data and the unfinished supply data according to the same or different situations of the demand and supply amount, the demand and supply factory, the demand and supply manufacturing technology, and the supply term and allocation term.

Finally, a portion of the unfinished demand data not belonging to the unfinished supply data is designated as third priority demand data. Here, the third priority demand data assignment is the same as the second priority demand data assignment, divided into a pair of comparisons and considering different situations of the demand and supply amount, the demand and supply factory, the demand and supply manufacturing technology, and the supply term and allocation term.

In addition, the method may combine and output the first, second, and third priority demand data after the mentioned steps. The method also updates the supply data according to the first, second, and third priority demand data.

The prioritized demand data can be provided for further utilization, such as capacity allocation planning. The mentioned method accomplishes the main idea of maintaining a supply plan, that is, the order data should be totally fulfilled, the demand data promised by the supply plan should be kept at a lower priority than the order data, and the demand data exceeding the supply plan should carry the lowest

priority. In this way, the inventive method resolves conventional problems, such as unexpected operation errors and sharp order amount changing.

One embodiment of the invention is directed to a storage medium for storing a computer program providing a method of classifying demand data for one allocation term. The method may include the steps mentioned above.

Another embodiment is directed to a system of classifying demand data for one allocation term. The system includes a demand database, a supply database, a customer interface, and a controller computer.

The demand database stores the demand data and the supply database stores supply data. The customer interface enables input of order data of the allocation term. The controller computer is paired to the demand database, the supply database, and the customer interface. The controller computer classifies the demand data into prioritized demand data according to the order data and the supply data.

The controller computer classifies the demand data by data assignment. First, the controller computer designates a portion of the demand data, belonging to the order data, as first priority demand data. Next, the controller computer designates a portion of the demand data, not belonging to the order data, as unfinished demand data and a portion of the supply data, not belonging to the order data, as unfinished supply data. The controller computer then designates a portion of the unfinished demand data, belonging to the unfinished supply data, as second priority demand data, and designating a portion of the unfinished demand data, not belonging to the unfinished supply data, as third priority demand data.

The detailed steps of the first, second, and third priority demand data assignment are similar to the detailed comparisons in the method summarized above.

Another embodiment of the invention is directed to a system of demand and capacity management. The system includes an allocation planning module, a capacity model, and a capacity management module. The allocation planning module receives demand data for one allocation term, order data of the allocation term, and supply data. The capacity model has route information for the product, wherein the route information records tools. The capacity management module reserves capacity according to the demand data and the route information.

The allocation planning module includes a data input module and a classifying module. The allocation planning module performs the functions provided by the method mentioned.

The system can be applied to supply chain management for a manufacturer. The allocation planning module is the first part of the supply chain management. The allocation planning module handles the demand data and maintains the supply plan for the duration of the supply plan. As an example, the result obtained by the allocation planning module may be distributed to the factories for accomplishing costumers' demands.

Fig. 1 is a flowchart of a computer-implemented method of classifying demand data for one allocation term. In one embodiment, the demand data for one allocation term, order data of the allocation term, and supply data are first input (step S100).

Next, the demand data is classified into prioritized demand data according to the order data and the supply data (step S102).

Afterwards, the prioritized demand data are combined and output (step S104), and the supply data is updated thereafter (step S106).

The demand data may include demand amounts, demand factories, and demand manufacturing technologies. The demand factories and the demand manufacturing technologies are paired with the demand amounts. The order data includes order amounts, corresponding order factories, and corresponding order manufacturing technologies. The supply data includes supply amounts, supply factories, supply manufacturing technologies, and supply terms. The supply factories, the supply manufacturing technologies, and the supply terms all correspond to the supply amounts as well.

The classification step (step S102) of Fig. 1 can be subdivided into several sub-steps. Fig. 2 is a flowchart of detailed steps of the classification step of FIG. 1. First, a portion of the demand data, belonging to the order data, is designated as first priority demand data (step S200). This portion may be designated in the manner described above.

Next, a portion of the demand data, not belonging to the order data, is designated as unfinished demand data. A portion of the supply data, not belonging to the order data, is designated as unfinished supply data (step S202).

Afterwards, a portion of the unfinished demand data, belonging to the unfinished supply data, is designated as second priority demand data (step S204).

Finally, a portion of the unfinished demand data not belonging to the unfinished supply data is designated as third priority demand data (step S206).

Fig. 3a is a flowchart of detailed steps of the assignment step of one embodiment. The first priority demand data assignment is finished by certain comparisons. First, the assignment compares the order data and the demand data according to the same order amount and demand amount, the same order factory and demand factory, and the same order manufacturing technology and demand manufacturing technology (step S300).

The assignment then compares the order data and the demand data according to the same order amount and demand amount, the different order factory and demand factory, and the same order manufacturing technology and demand manufacturing technology (step S302).

Finally, the assignment is terminated by comparing the order data and the demand data according to the same order amount and demand amount, the same order factory and demand factory, and the different order manufacturing technology and demand manufacturing technology (step S304).

The above comparisons are constructed of considering the related items, such as amount, factory, and manufacturing technology. The ideal situation is all the items matched, thus the order or demand is fully satisfied. If the items are not all matched, the items will be considered one by one for matching, trying to fulfill the order and demand.

Fig. 3b is a flowchart of detailed steps of the assignment step of Fig. 3a. The second and third priority demand data designations are also accomplished by several comparisons. The designations

compare the unfinished demand data and the unfinished supply data according to the same demand amount and supply amount, the same demand factory and supply factory, the same demand manufacturing technology and supply manufacturing technology, and the same supply term and allocation term (step S306).

The designations then compare the unfinished demand data and the unfinished supply data according to the same demand amount and supply amount, the different demand factory and supply factory, the same demand manufacturing technology and supply manufacturing technology, and the same supply term and allocation term (step S308).

The designations compare the unfinished demand data and the unfinished supply data according to the same demand amount and supply amount, the same demand factory and supply factory, the same demand manufacturing technology and supply manufacturing technology, and the different supply term and allocation term (step S310).

Finally, the designations compare the unfinished demand data and the unfinished supply data according to the same demand amount and supply amount, the same demand factory and supply factory, the different demand manufacturing technology and supply manufacturing technology, and the same supply term and allocation term (step S312).

Fig. 4 is a diagram of the system for classifying demand data for one allocation term. The system includes a demand database 40, a supply database 42, a customer interface 44, and a controller computer 46.

The demand database 40 stores demand data 48 for one allocation term and the supply database 42 stores

supply data 50. The customer interface 44 enables input of order data 52 of the allocation term.

The controller computer 46, paired to the demand database 40, the supply database 42, and the customer interface 44, classifies the demand data 48 into prioritized demand data according to the order data 52 and the supply data 50.

The controller computer 46 classifies the demand data 48 by certain designations. The controller computer designates a portion of the demand data 48, belonging to the order data 52, as first priority demand data. The controller computer 46 designates a portion of the demand data 48, not belonging to the order data 52, as unfinished demand data and a portion of the supply data 50, not belonging to the order data 52, as unfinished supply data. The controller computer designates a portion of the unfinished demand data, belonging to the unfinished supply data, as second priority demand data, and designates a portion of the unfinished demand data, not belonging to the unfinished supply data, as third priority demand data.

The first, second, and third priority demand data designations are individually comprised of several comparisons according to the different conditions of the order data and the supply data, such as the same or different amount, factory, manufacturing technology, and term.

Fig. 5 is a diagram of the storage medium for storing a computer program providing a method of classifying demand data for one allocation term. The storage medium 60 stores a computer program 62. The computer program 62 provides a method of classifying demand data for one allocation term. The program mainly includes logic for inputting data 64, logic for

classifying demand data 66, logic for combining and outputting prioritized demand data 68, and logic for updating supply data 70.

Thus, a method of classifying demand data for one allocation term is provided by embodiments of the invention. The disclosed method utilizes the order data and the supply data to classify the demand data for maintaining the promised supply amount in the duration of a supply plan, solving the conventional problems. The inventive method is specifically useful in high technology-related fields, such as an IC manufacturer, presenting significant advantages in supply plan management.

It will be appreciated from the foregoing description that the system and method described herein provide a dynamic and robust solution to the supply plan maintaining problem. If, for example, there is an promised supply plan between the manufacturer and the customer, the system and method of the present invention can revise the prioritized demand data into more classes to satisfy the supply plan.

The methods and system of the present invention, or certain aspects or portions thereof, may take the form of program code (i.e., instructions) embodied in tangible media, such as floppy diskettes, CD-ROMS, hard drives, or any other machine-readable storage medium, wherein, when the program code is loaded into and executed by a machine, such as a computer, the machine becomes an apparatus for practicing the invention. The methods and apparatus of the present invention may also be embodied in the form of program code transmitted over some transmission medium, such as electrical wiring or cabling, through fiber optics,

or via any other form of transmission, wherein, when the program code is received and loaded into and executed by a machine, such as a computer, the machine becomes an apparatus for practicing the invention. When implemented on a general-purpose processor, the program code combines with the processor to provide a unique apparatus that operates analogously to specific logic circuits.

While the invention has been described by way of example and in terms of the preferred embodiments, it is to be understood that the invention is not limited to the disclosed embodiments. To the contrary, it is intended to cover various modifications and similar arrangements (as would be apparent to those skilled in the art). Therefore, the scope of the appended claims should be accorded the broadest interpretation so as to encompass all such modifications and similar arrangements.